Research on World Agricultural Economy
https://journals.nasspublishing.com/index.php/rwae

ARTICLE

Value Chain of Robusta Coffee in Wonogiri, Indonesia: Analysis of Performance and Role of Producer Organisations

Fanny Widadie [*] ***, Endang Siti Rahayu, Setyowati***

Agribusiness Department, Faculty of Agriculture, Sebelas Maret University, Surakarta Central Java 57126, Indonesia

ABSTRACT

The Robusta coffee value chain in Wonogiri Regency, Central Java, Indonesia in this study is investigated from the structure, economic performance, and the role of the producers in enhancing smallholder integration. Data were collected via mixed methods from 33 respondents including farmers, producer organisations, collectors, wholesalers, processors, and cafe owners. Seven marketing channels were identified: traditional routes dominated by intermediaries to more vertically integrated routes involving producer organisations and small–medium processors. Value chain mapping showed that farmers produce mostly fresh cherries, and downstream players do major value–adding activities like drying, hulling, roasting, grinding, and packaging. Economic analysis showed that marketing margins and profit vary considerably between channels. Profits reached Rp 61,070/kg in channels where producer organisations and small–medium processors perform downstream processing. On the contrary, traditional channels gave collectors and wholesalers the highest margins, while farmers received low returns. Across channels led by producer organizations, the share of the final consumer price ranged from 34.48% to 44.62%. Results indicate that organisational coordination, value addition, and market access are necessary for smallholder benefits improvement. Despite positive trends, challenges including limited processing capacity at the farm level,

*CORRESPONDING AUTHOR:
Fanny Widadie, Agribusiness Department, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta Central Java 57126, Indonesia; Email: fannywidadie@staff.uns.ac.id

ARTICLE INFO
Received: 30 May 2025 | Revised: 27 June 2025 | Accepted: 11 July 2025 | Published Online: 28 August 2025
DOI: https://doi.org/10.36956/rwae.v6i4.2242

CITATION
Widadie, F., Rahayu, E.S., Setyowati, 2025. Value Chain of Robusta Coffee in Wonogiri, Indonesia: Analysis of Performance and Role of Producer Organisations. Research on World Agricultural Economy. 6(4): 38–51. DOI: https://doi.org/10.36956/rwae.v6i4.2242

poor infrastructure, and weak market linkages remain. A strong producer organisation, improved access to processing technologies, and institutional support are necessary for inclusive and sustainable value chain development.
Keywords: Robusta Coffee; Value Chain Analysis; Marketing Channels; Producer Organizations; Smallholders; Economic Performance; Indonesia

1. Introduction

Coffee, the most widely traded agricultural commodity, is produced by more than 125 million people in more than 70 countries [1]. Coffea canephora – Robusta is the main crop of the global coffee sector and supports small farmers in tropical lowland and mid–altitude regions [2]. Robusta is mainly appreciated for its resistance to pests and diseases, tolerance to marginal environments, and relatively high yield under minimal input conditions. In Indonesia, coffee is an important agricultural export and rural livelihood source, and around 96% of production is managed by smallholders. Robusta accounts for 74% of national coffee production, totaling 570,000 of 774,000 tons harvested in 2022 [3]. Indonesia is the fourth largest coffee producer and second largest Robusta exporter in the world [4].

In this national context, the Wonogiri Regency in Central Java is an attractive place to cultivate robusta coffee, especially in the southeastern highland zone of Pegunungan Seribu and Lawu. Coffee production is concentrated in some subdistricts like Girimarto, Jatipurno, Tirtomoyo, Bulukerto, and Slogohimo at elevations of 400 to 800 metres above sea level – conditions ideal for Robusta growth. The cultivated area increased from 149 hectares in 2020 to 182 hectares in 2024, and production increased from 44,481 kg to an estimated 47,765 kg in 2024 [5]. This increase reflects the growing interest and investment of farmers in coffee as a regional economic commodity.

However, despite its increasing importance, the Robusta coffee sector in Wonogiri still faces several barriers to competitiveness and inclusion. Smallholder farmers are often the primary producers and face structural bottlenecks along the coffee value chain such as low input quality, poor extension services, poor post–harvest handling, price volatility, asymmetric market information and weak bargaining power in downstream transactions [6]. Multiple intermediaries further diluted producer margins and reduced incentives for quality improvement [7]. In addition to this, weak horizontal coordination between farmers and fragmented vertical links with markets and processors prevent smallholders from equally benefiting from value added along the chain.

Value chain analysis (VCA) provides a way to systematically assess these dynamics: flow of products, information, service, and value from production to end markets. VCA highlights key actors, governance mechanisms, cost structures, and performance inefficiencies and identifies improvement strategies to improve value capture and inclusion [8, 9]. VCA can be applied to coffee to diagnose market failures, promote institutional coordination, and design policy interventions to increase smallholder resilience and competitiveness.

Important institutional actors in agriculture value chains are producer organisations such as farmer groups or cooperatives. Producer organisations (POs) are important actors in improving the participation of smallholders in agricultural value chains through aggregation, processing, and market access [10]. However, their performance varies widely. Some POs are successful due to strong governance, access to processing facilities, and established market links that help them create more value. Some organisations lack resources, have weak internal capacity, and poor downstream connections, limiting their ability to improve member outcomes [11]. Understanding these factors is essential to improve PO performance and ensure they deliver real benefits to smallholder farmers. In many parts, including Wonogiri, producer organisations have limited capacity, weak internal accountability, and little influence on market governance. Thus, they are not yet sufficiently applied to raise smallholders and restructure unequal power relations in the value chain [12].

Coffee value chain studies in Indonesia mostly focus on Sumatra, Sulawesi, and other regions at the na-

tional level [13, 14]. However, there has been no empirical research dedicated to specifically studying the Robusta coffee value chain at the regional or district level, particularly in Central Java, Wonogiri Regency. Additionally, the existing literature has paid little attention to the role and effectiveness of producer organisations, such as farmer groups and cooperatives, in improving smallholder integration, reducing information asymmetries, and improving value capture in Robusta coffee chains. Also, there are only a few studies that follow a complete value chain analysis framework involving structural mapping, economic assessments, and institutional constraints in new Robusta–growing areas, such as Wonogiri. This study aims to fill the gaps by conducting a detailed and localised assessment of the structural and economics performance of the Robusta coffee value chain, focusing on the role of producers' organisations in enhancing participation and access to the smallholder market.

Given this background, this work is conducted to assess the robusta coffee structure, performance, and the role of producer organisations in smallholder outcomes in Wonogiri Regency. The specific objectives are: (1) mapping the structure and actors of the Robusta coffee value chain. (2) evaluate the economic performance of value chains in terms of value distribution, cost–benefit flows, and producer margins; (3) evaluate the contribution of producer organisations in value chains to smallholder integration and market participation. This work contributes to empirical evidence and the body literature on inclusive agricultural value chains. It also provides insight into policy issues related to rural development, value chain upgrading, and institutional strengthening in emerging coffee regions.

2. Materials and Methods

2.1. Study Area and Research Design

This study was carried out in the Wonogiri Regency, Central Java, Indonesia – specifically in the southeastern highland subdistricts of Girimarto, Jatipurno, and Jatiroto, which are recognised as the three highest Robusta coffee–producing areas in the region. These locations, situated at elevations between 400 and 800 metres above sea level, offer favourable agroecological conditions for Robusta cultivation, including moderate temperatures, adequate rainfall, and fertile soils.

The research adopted a qualitative and quantitative approach to provide a comprehensive assessment of the Robusta coffee value chain. A multistage sampling strategy was applied. Multistage and snowball sampling techniques were used to identify relevant actors in coffee value chains. In the first stage, 20 Robusta coffee farmers from Girimarto, Jatipurno, and Jatiroto were purposively selected to represent the production base. In the second stage, using information obtained from these farmers through snowball sampling, institutional actors involved in the marketing of coffee were identified. These included producer organisations, local collectors, and small– to medium–scale processors. Subsequently, based on the direction of product flows and marketing links revealed by these institutional actors, downstream actors such as cafés and wholesalers were also included in the sample.

The total sample of this research is 33 respondents, which is considered enough for qualitative research, which emphasises detailed information and case–specific research. Due to the relatively small size of Robusta coffee in Wonogiri and the research objective of studying actors and institutions in the coffee value chain, the researcher used purposive and snowball sampling so that respondents with the most relevant information are included. According to established qualitative research standards, especially for case studies, a sample size of 15 to 30 respondents is generally sufficient to achieve information saturation, where additional respondents are unlikely to provide new insights [15]. This approach enabled the study to capture vertical and horizontal links within the value chain. The distribution of the respondents sampled by actor category is presented in **Table 1**.

2.2. Data Collection

This study used primary and secondary data sources to analyse the Robusta coffee value chain in the Wonogiri Regency. From July to October 2024, primary data collection was carried out through semi–structured interviews, key informant interviews (KII) and field observations. 20 selected Robusta coffee farmers from Girimarto, Jatipurno, and Jatiroto subdistricts

were sent semi–structured questionnaires. These instruments recorded production practices, the cost of farming, input usage, post–harvest handling, and marketing information. Exploring the institutional and marketing dimensions of the value chain involved key informant interviews with producer organisations (PO), local collectors, wholesalers, small–to medium–scale processors and cafe owners. These interviews covered product flows, price formation, post–harvest handling, the cost of marketing, value addition, and coordination mechanisms along the chain. Farming conditions, processing facilities, and organisational practices were documented through field observations in addition to interview data. The audio–recorded interviews were all transcribed with prior consent.

Secondary data came from institutions such as the Central Bureau of Statistics (Badan Pusat Statistik – BPS), which provided official statistics on coffee production volumes and cultivated areas. Other information was obtained from Dinas Perkebunan Jawa Tengah (Provincial Plantation Agency) regarding local development trends and support programmes. The academic literature and previous research were also reviewed for empirical support of the study.

Table 1. Respondents.

No	Value Chain Actors	Number of Respondents
1	Coffee farmers	20
2	Producer organisations	3
3	Local collectors	4
4	Wholesalers	2
5	Small–medium processors	2
6	Caffe owners	2

2.3. Data Analysis

The study used a Value Chain Analysis (VCA) framework with a focus on three interrelated analytical dimensions: structure, performance, and governance [8, 9]. This framework enabled a comprehensive assessment of the roles, economic benefits, and institutional dynamics of the actors shaping the Robusta coffee value chain in the Wonogiri region.

2.3.1. Value Chain Mapping

To analyse the structure of the value chain, value chain mapping was conducted to identify key actors, their roles, and the flow of products and information from farm–level production to final markets [16]. The mapping also considered the direction and strength of the linkages between actors and how these relationships shaped the flow of coffee and the distribution of value. Functional flow diagrams were constructed to visualise the interactions among actors and the sequence of value–adding activities [17]. This structural mapping helped uncover potential bottlenecks, duplication, and weak links within the chain.

2.3.2. Economic Performance Analysis

To evaluate the economic performance of the Robusta coffee value chain, the study analysed profitability, the distribution of margins between actors, and the share of farmers [18, 19]. Key performance indicators were calculated using primary data on operational expenses, sales prices, and marketing costs reported by farmers, collectors, wholesalers, processors, and café owners.

The marketing margin (MM) was calculated as the difference between the selling price (SP) and the purchase price (PP) at each node [20]:

$$MM = SP - PP$$

The gross marketing margin (GMM) was calculated to assess the portion of the final selling price retained before deducting marketing costs:

$$GMM = \frac{SP - PP}{SP} \times 100\%$$

The net marketing margin (NMM) included cost adjustments and was calculated as:

$$NMM = \frac{SP - (PP + MC)}{SP} \times 100\%$$

where MC represents the marketing cost incurred by each actor.

The farmer's share (FS) of the final consumer price was assessed to evaluate the proportion of value retained by producers:

$$FS = \frac{Farmgate\ Price}{Consumer\ Price} \times 100\%$$

In addition to these standard measures, the study also performed a margin distribution analysis to evaluate how the total value added along the chain was shared among the actors. The margin distribution for each actor was calculated using the following formula:

$$\text{Margin Distribution}(\%) = \frac{\text{Margin of Actor}}{\text{Total Chain Margin}} \times 100\%$$

where the margin of the actor is the individual margin earned by a specific actor (e.g., farmer, collector, processor). The total chain margin is the total difference between the final consumer price and the initial farmgate price.

3. Results

3.1. Demographic and Socio–Economic Characteristics of Coffee Farmers

Table 2 presents the demographic and socioeconomic profiles of the coffee farmers surveyed. Household heads averaged 53.6 years of age and ranged from 21 to 80 years, suggesting that middle–aged to older farmers work in coffee production. The mean education was 5.48 years, with some respondents having no education and some reaching 16 years, reflecting the wide variation in educational attainment.

Table 2. Demographic and socio–economic characteristics of coffee farmers.

Variable	Mean	Min	Max	Standard Deviation
Age of household (year)	53.6	21	80	12.27
Education level (year)	5.48	0	16	3.44
Household member (number)	3.28	1	6	0.88
Total land holding (ha)	1.22	0.05	8	1.21
Land allocated for coffee (ha)	0.66	0.01	5	0.79
Number of coffee plants	895.5	40	22,500	2169.91
Experience of farming (year)	4.2	1	16	3.12
Involved in farmer group (dummy)	0.61	0	1	0.48

Household sizes averaged 3.28 members with a minimum of 1 and a maximum of 6, suggesting small to moderate–sized families. The average total land holding was 1.22 hectares, with 0.66 hectares for coffee cultivation. However, there was heterogeneous land ownership, from 0.05 to 8 hectares of total landholding and 0.01 to 5 hectares of coffee land, as shown by the table.

The average farmer managed 895.5 coffee plants, with an extremely variable range of 40 to 22,500, reflecting different scales of production in the home. The average experience was 4.2 years, suggesting a relatively recent involvement in coffee cultivation among many respondents. Moreover, 61% of farmers reported membership in farmer groups indicating moderate institutional participation which may affect access to information, resources, and markets. These findings show that coffee producers vary in demographic and structural conditions.

3.2. Value chain mapping of robusta coffee in Wonogiri

The value chain mapping of Robusta coffee in Wonogiri in **Figure 1** reveals a complex structure that involves multiple actors, functions, and market channels from input provision to final consumption. This section presents the composition of actors, the flow of products, marketing channels, and the functional roles of each actor in the value creation process.

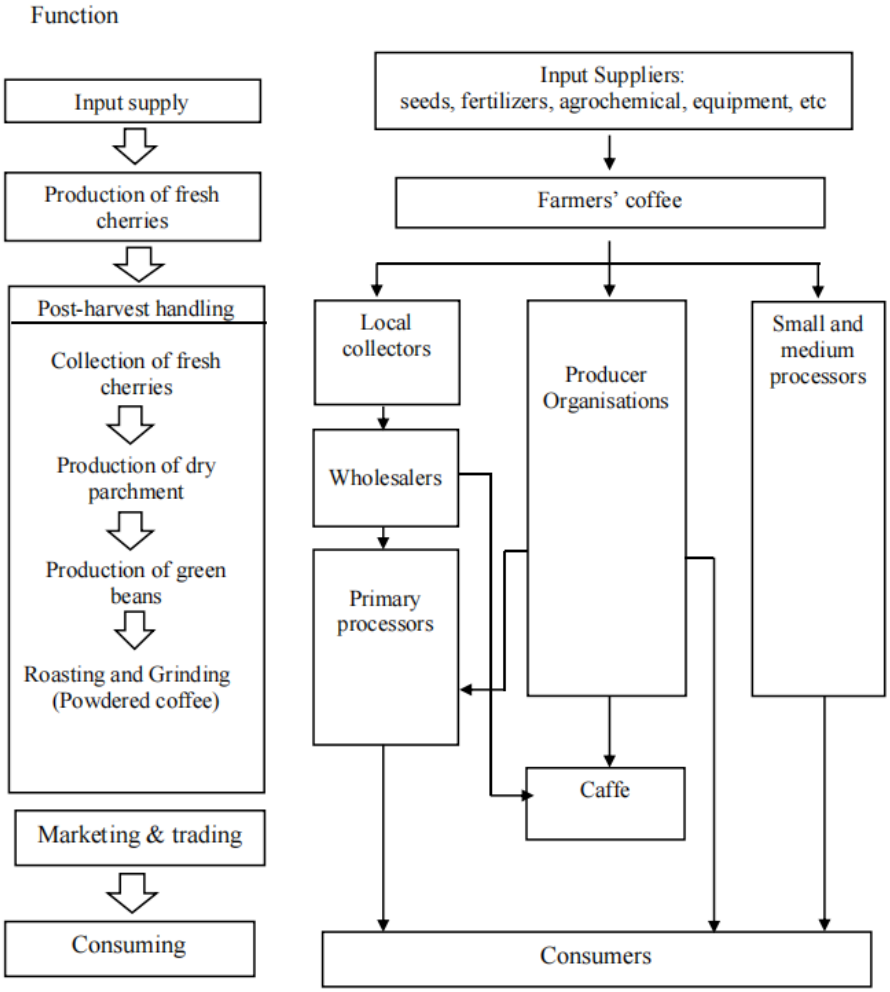

Figure 1. Value chain mapping of coffee in Wonogiri.

3.2.1. Product flow and Marketing Channels

The flow of coffee products from the farmer to the consumer follows seven distinct marketing channels, reflecting varying degrees of integration and value addition.

a. Channel 1: Farmers → Local Collectors → Wholesalers→ Primary Processors → Consumers
b. Channel 2: Farmers → Local Collectors → Wholesalers → Cafés → Consumers
c. Channel 3: Farmers → Producer Organizations → Primary Processors → Consumers
d. Channel 4: Farmers → Producer Organizations → Cafés → Consumers
e. Channel 5: Farmers → Producer Organizations → Consumers
f. Channel 6: Farmers → Small and Medium Processors → Cafés → Consumers
g. Channel 7: Farmers → Small and Medium Processors → Consumers

Channels 1 and 2 represent traditional multi–actor trade routes with limited value retained by producers. On the contrary, channels 5 to 7 reflect more integrated value chains where producers or SMEs capture more downstream functions and associated value.

3.2.2. Actors and Their Roles in the Value Chains

The Robusta coffee value chain in Wonogiri involves a number of interdependent actors that create value through production, processing, distribution, and marketing. The roles and functions of each actor are summarised as follows:

a. Input Suppliers: They are agro–input dealers –

and sometimes local kiosks – that provide basic farming inputs such as coffee seedlings, fertilisers, agrochemicals, and tools. Their function is fundamental in promoting agricultural productivity and sustainability.

b. Farmers: The primary producers of fresh coffee cherries are coffee farmers. Then, they initiate the value chain and determine the quality of raw material through agronomic practices. Farmers sell directly to local collectors, producer organisations, and small processors.

c. Local Collectors: These actors buy fresh cherries from farmers, typically at the farm gate, and then act as intermediaries in aggregating and transporting cherries to wholesalers or processors. They help connect dispersed producers with the broader market, although they reduce the share of value captured by farmers.

d. Producer Organisations: They usually operate as farmer groups or associations and are responsible for the aggregation, sorting and primary processing of coffee (drying on parchment or hulling on green beans). Some producer organisations roast and grind. They facilitate market access, collective bargaining, and value addition through basic processing.

e. Small & Medium Processors (SMEs): These processors also perform additional value–adding activities like drying, hulling, roasting, and grinding, often turning fresh cherries into green beans or finished powdered coffee. SMEs serve local/regional markets and are a critical node in vertically integrated channels.

f. Wholesalers: Wholesalers typically buy and distribute green beans in bulk. These link upstream collectors/cooperators with downstream processors/retail chains. They help scale volume and maintain a steady supply across the value chain.

g. Primary processors: Such establishments roast and grind green beans to make coffee powder. They produce consumer–ready items and may package coffee for retail sale. They determine product quality, branding, and market competitiveness.

h. Cafes (Caffe): They double as processors and retailers; cafes buy green beans or roasted beans and make brewed coffee for direct consumption. Sometimes they even roast and grind. They link the value chain directly to consumers and influence consumer preferences and feedback.

3.2.3. Value Added Activities of the Coffee Value Chain

Each actor contributes unique value–added activities that improve the quality, marketability and price of the coffee product as it moves up the chain. These activities vary across the seven marketing channels defined in Wonogiri:

a. Farmers: Add value by producing high–quality fresh cherries through improved cultivation/pruning/selective harvesting / timely post–harvest practices. In channels 3 to 7, farmers working with producer organisations or small businesses contribute further by drying or bulking products.

b. Local collectors (Channels 1 and 2): Contribute by picking cherries from dispersed farmers and shipping them to wholesalers or processors. They may do light sorting or storage, but minimal processing. Their contribution is mostly logistical.

c. Producer Organisations (Channels 3, 4, 5): Add value by collective aggregation, sorting, fermentation, drying (in parchment), hulling (in green beans), and sometimes roasting and grinding. All these steps increase shelf life, quality, and traceability of coffee, thereby increasing commercial value. As in Channel 5, producer organisations complete virtually the entire processing chain for full value retention.

d. Small and Medium Processors (channels 6 and 7): Complete a series of value–adding activities, such as processing fresh cherries into dry parchment, then roasting and grinding. Their integration over processing stages reduces transaction cost and allows branding/packaging/market differentiation.

e. Wholesalers (Channels 1 and 2): The bulk handling, storage, and transport of green beans to processors or urban markets add value. They do not

change the physical form of the product, but scale and logistics add efficiency to the supply chain.

f. Primary Processors (Channels 1 and 3): Convert green beans to ground and roasted coffee, improving flavour, aroma, and consumer readiness. This transformation substantially increases the value of the product and is in line with market expectations.

g. Cafes (channels 2, 4 and 6): Roast, grind, and prepare coffee for consumption – providing tailored brewing methods and quality experiences to consumers. Their added value lies in the preparation of the final product, customer service, and market interface.

Value–added activities increase progressively from upstream (production) to downstream (retail and consumption). Integrated processing channels, such as Channels 5, 6, and 7 create more value with fewer actors, where roasting, grinding, and direct marketing are performed by producers or local enterprises.

3.3. Performance of Economic Analysis

Analysis of marketing costs and margins throughout the coffee value chain (**Table 3**) revealed large variations in profit levels and value added activities between actors. Channels 1 and 2 saw local collectors and wholesalers perform basic transport, sorting, pulping, and parchment processing. The margin was higher for wholesalers, which made a profit of Rp 22,650/kg on a total of Rp 24,000/kg, while local collectors made a profit of Rp 9,600/kg on a margin of Rp 10,000/kg. These roles became more complex on Channels 3 to 7 with producer organisations and processors performing additional value–added services, including roasting, grinding, and packaging.

Table 3. Marketing cost and margin of actors in the coffee value chain.

Items (Rp/kg)	Channel						
	1	2	3	4	5	6	7
1. Farmers							
–Farm gate price	50,000	50,000	58,000	58,000	58,000	52,500	52,500
2. Local collectors							
–Buying price	50,000	50,000					
–Transportation	400	400					
–Selling price	60,000	60,000					
–Profit	9,600	9,600					
–Margin	10,000	10,000					
3. Wholesalers							
–Buying price	60,000	60,000					
–Transportation	500	500					
–Sorting	350	350					
–Parchment	100	100					
–Pulping	400	400					
–Selling price	84,000	84,000					
–Profit	22,650	22,650					
–Margin	24,000	24,000					
4. Producer organisation							
–Buying price			58,000	58,000	58,000		
–Transportation			80	80	80		
–Sorting			50	50	50		
–Parchment			100	100	100		
–Pulping					200		
–Roasting					24,000		
–Griding					900		
–Packaging					600		
–Selling price			80,000	80,000	145,000		
–Profit			21,770	21,770	61,070		
–Margin			22,000	22,000	87,000		

Table 3. *Cont.*

Items (Rp/kg)	Channel						
	1	2	3	4	5	6	7
5. Primary processor							
–Buying price	84,000		80,000				
–Transportation	500		500				
–Sorting	200		200				
–Roasting	23,000		23,000				
–Griding	1,000		1,000				
–Packaging	300		300				
–Selling price	130,000		130,000				
–Profit	21,000		25,000				
–Margin	46,000		50,000				
6. Small & Medium Processors							
–Buying price						52,500	52,500
–Transportation						600	600
–Sorting						350	350
–Parchment						120	200
–Pulping						300	300
–Roasting						25,000	25,000
–Grading						1,000	1,000
–Packaging						900	1,500
–Selling price						11,000	120,000
–Profit						29,230	38,550
–Margin						57,500	67,500
7. Caffe							
–Buying price		84,000		80,000		90,000	
–Transportation		350		400		800	
–Sorting		250		250			
–Roasting		22,000		22,000			
–Griding		2,000		2,000			
–Packaging		700		700		900	
–Selling price		145,000		145,000		135,000	
–Profit		35,700		39,650		41,300	
–Margin		61,000		65,000		45,000	
8. Consumers							
–Buying price	130,000	145,000	130,000	145,000	145,000	135,000	120,000
–Margin	80,000	95,000	72,000	87,000	87,000	82,500	67,500
Total Profit	53,250	67,950	46,770	61,420	61,070	29,230	79,850
Total Margin	80,000	95,000	72,000	87,000	87,000	57,500	112,500

The producers' organisations achieved the highest single–actor profit of Rp 61,070/kg in Channel 5, representing a strong addition of value through vertical integration. Channels 3 and 4 also added value by generating a profit of Rp 21,000–25,000/kg. In Channels 6 and 7, small and medium processors made profits of Rp 29,230/kg and Rp 38,550/kg, respectively, due to more intensive processing such as pulping, roasting, grading and packaging.

Table 4 details the margin distribution among chain actors. In channel 1, wholesalers have the largest share (30%), while primary processors account for 57.5% of the margin. In Channel 2, the distribution was more equitable, with processors (Cafe) receiving 64.2% of the food. More than 90% of the total margins were held by the producer organisation and the primary processor on channels 3 and 4. Channel 5 had complete downstream integration and was entirely controlled by the producer organisation (100% share margin). Channels 6 and 7 had small and medium processors taking 100% and 60%, respectively, while cafes took the remaining 40% in Channel 7.

Table 4. Distribution Margin.

Channel	Local Collector	Wholesaler	Producer Organisation	Primary Processor	Small–Medium Processor	Caffe
1	10,000 (12.5%)	24,000 (30%)	0	46,000 (57.5%)	0	0
2	10,000 (10.53%)	24,000 (25.26%)	0	0	0	61,000 (64.21%)
3	0	0	22,000 (30.56%)	50,000 (69.44%)	0	0
4	0	0	22,000 (25.29%)	0	0	65,000 (74.71%)
5	0	0	87,000 (100.0%)	0	0	0
6	0	0	0	0	57,500 (100.0%)	0
7	0	0	0	0	67,500 (60.0%)	45,000 (40.0%)

In **Table 5**, the farmer's share of the final consumer price was 34.48% (channel 2), –44.62% (channel 3), which corresponded to relatively modest returns across all channels. The gross marketing margin (GMM) ranged from 55.38% to 65.51%, with the highest margins in channels with high processing and retail activities (channels 2 and 4). The same trend was observed for net marketing margins (NMM), where the highest efficiency was recorded on channel 2 (46.86%) and the lowest on channel 7 (29.04%). These figures show that the value addition is higher in more complex chains, but farmer benefits are reduced by increasing intermediary margins.

Table 5. Farmers' share.

Channel	1	2	3	4	5	6	7
GMM (%)	61.53	65.51	55.38	60	60	61.11	56.25
NMM (%)	40.96	46.86	35.97	42.35	42.11	40.17	29.04
Farmers' share (%)	38.46	34.48	44.62	40.0	40.0	38.89	43.75

4. Discussion

This study highlights the structure, economic performance and value distribution along the Robusta coffee value chain in the Wonogiri region, Indonesia. Value chain mapping identifies a structurally diverse and multinodal network through which coffee moves from producers to consumers through at least seven marketing channels. They include linear supply chains involving local collectors and wholesalers (Channels 1 and 2) through vertically integrated routes governed by producer organisations or small–medium processors (Channels 5 to 7). This multiplication of channels reflects both the flexibility and fragmentation of the local coffee economy. It opens multiple entry points into the market for smallholders, but it also points to weak governance and coordination mechanisms. Channels dominated by intermediaries discourage quality improvement and reduce the capture of farmer value, as evidenced by the higher margins absorbed by collectors and wholesalers [21]. In contrast, value chains under the leadership of producer organisations and small businesses (Channels 5–7) show consolidated functional roles and sequential value–adding activities. Such integrated models reflect the coordinated governance structures of value chain theory, allowing traceability, quality control, and value capture [22, 23].

Regarding the value distribution, it shows that upstream actors, particularly farmers, get a relatively small share of the final consumer price across all channels (34.48% in Channel 2 and 44.62% in Channel 3). They are in line with observations elsewhere in coffee–producing regions, where farmers typically capture less than half of the consumer price [24]. In channels where

traditional marketing routes are involved (channels 1 and 2), local collectors and wholesalers control 35–40% of the margin with little value–adding activities. This reinforces the notion that asymmetric power relations and information opacity in spot markets allow intermediaries to take disproportionate value from producers [25].

Channels with more vertically integrated actors, producer organisations (POs) and small–medium processors, demonstrate higher profit capture and margin control compared to the former. The highest single–actor profit and total margin (Rp 87,00/kg) are recorded in channel 5, where the producer organisation controls the entire downstream process from parchment to roasted and packaged coffee. This finding echoes the view that upstream integration in processing and marketing could boost smallholder incomes and bargaining power [12, 26]. Channels 6 & 7 also highlight the role of small and medium processors strategically. By combining drying, hulling, roasting, grading, and packaging, SMEs captured 100% of the margin in Channel 6 and 60% in Channel 7. These results imply that empowerment of local processing companies and improving their access to capital and technical capacity could be one way to achieve equitable value chain upgrading [27].

The finding of this study underscores the pivotal role that producer organisations (POs) play in improving value chain performance, improving smallholder integration, and promoting equitable value distribution in the Robusta coffee sector of Wonogiri. The evaluation of Channels 3, 4 and especially Channel 5 demonstrates how POs can grow from simple aggregators to key value chain coordinators handling post–harvest processing and downstream functions including roasting, grinding and packaging.

Producer organisations in Channel 5 realised full vertical integration with 100% share in marketing margins (Rp 87,000/kg) and the highest recorded profit (Rp 61,070/kg). This case demonstrates that POs can upgrade with adequate processing facilities, market access, and governance arrangements. Assertions by PO of the roles usually played by intermediaries improve bargaining power and contribute to more localised value retention, an outcome well known in the agri–food value chain literature [28, 29].

Besides profit capture, POs in this study provided several non–monetary benefits to their members, including improved access to training, post–harvest infrastructure, and collective bargaining platforms. Such results follow from previous studies that found strong producer organisations reduced transaction costs, created economies of scale, and increased member participation in high–value markets [12, 25].

Producer organisations (POs) ensure margin retention and coordination along the value chain. In addition to economies of scale in input procurement and aggregation, POs in Channels 3, 4, and 5 add value through sorting, pulping, roasting, and packaging. Only channel 5 demonstrates full integration and retention of margins, but many POs remain functionally limited or lack institutional capacity. This reflects previous work indicating that POs often suffer from managerial weaknesses, limited market access, and low capitalisation which limit their upgrading potential [30, 31].

The analysis also identifies channel–specific inequalities in producer organisation effectiveness. Although channel 5 showed outstanding performance, POs in channels 3 and 4 showed poorer integration and margin control. This variation reflects larger problems facing smallholder organisations in Indonesia and other developing countries, including low capital, limited technical capacity, and fragmented institutional support [12, 31]. Without adequate investment in organisational development, many POs remain confined to basic functions and cannot compete with more capitalised actors such as wholesalers or processors. Additionally, most producers' organisations remain market–based with little formal contracting or long–term buyer relationships. This prevents them from influencing market terms or stabilising demand for processed coffee products. A stronger institutional link between POs and downstream buyers, cafes, exporters, or cooperatives, could enhance value chain coordination and promote inclusive upgrading.

5. Conclusions

This study examined the Robusta coffee value chain in Wonogiri, Indonesia, focusing on its structure, economic performance, and the role of producer organisa-

tions in the value chain. The analysis revealed seven distinct marketing channels varying in integration and value addition. Traditional channels dominated by collectors and wholesalers provided little return to farmers, while integrated chains involving producer organisations and small–medium processors provided greater value capture. The best profits and margins came from Channel 5, where the producer organisation took care of processing and marketing and took 100% of the profit, making Rp 61,070/kg profit. Farmers in all channels still receive modest shares of the final consumer price, ranging from 34.48% to 44.62%.

This study highlights the critical role of producer organisations in improving coordination, processing capacity, and market access. But most remain constrained by weak infrastructure, low technical skills, and low downstream linkages. Policies should support producer organisations through training and capital support, invest in local processing infrastructure, build vertical links with buyers, and improve access to finance and extension services. Better coordination between actors is also needed through inclusive governance mechanisms. Such interventions could support fair value distribution, smallholder resilience, and sustainable coffee value chain development in emerging regions like Wonogiri.

Several policy actions are recommended to promote a more inclusive and competitive Robusta coffee value chain in Wonogiri. To strengthen the capacity of producer organisations, training and governance structures need to be improved, and they should have access to financial resources so that they can start adding value and integrate better into the market. In addition, it should be an encouragement to integrate a certification scheme such as Fair Trade or Organic to improve product quality, traceability, and market access. Farmers can have direct market links and reduced information asymmetries through the promotion of digitalisation, including mobile–based price information systems and digital platforms. In addition, creating local processing infrastructure and improving the links between producer organisations, downstream buyers, and supporting institutions can enhance smallholder benefits and lead to sustainable development of the value chain.

Author Contributions

F.W.: conceptualization, methodology design, data analysis, and manuscript writing; E.S.R.: field data collection, literature review, and validation of results; S.: data curation, editing, and visualization. All authors have read and agreed to the published version of the manuscript.

Funding

This research was funded by Universitas Sebelas Maret through the *Hibah Penelitian Unggulan Terapan*, Grant No. 194.2/UN27.22/PT.01.03/2024.

Institutional Review Board Statement

Ethical review and approval were waived for this study because it posed minimal risk to participants and did not involve the collection of sensitive personal data. Participation was entirely voluntary, with informed consent implied through the completion of the questionnaire. The study adhered to the principles outlined in the Declaration of Helsinki.

Informed Consent Statement

Informed consent was obtained from all participants. Consent was implied through the voluntary completion of the questionnaire after being informed about the study's objectives and procedures.

Data Availability Statement

Data will be made available on request.

Acknowledgements

The authors would like to thank Universitas Sebelas Maret for its financial support through the *Hibah Penelitian Unggulan Terapan* program. We also extend our sincere appreciation to all respondents—farmers, producer organizations, collectors, processors, wholesalers, and café owners—for their valuable time, in-

sights, and cooperation during the fieldwork.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] International Coffee Organization, 2022. Coffee market overview. Available from: https://unctad.org/system/files/non-official-document/MYEM-ITEM_3a-Patacconi-10.10.22.pdf (cited 17 May 2025).

[2] González–Orozco, C.E., Porcel, M., Byrareddy, V.M., et al., 2024. Preparing Colombian coffee production for climate change: Integrated spatial modelling to identify potential robusta coffee (Coffea canephora P.) growing areas. Climatic Change. 177, 67. DOI: https://doi.org/10.1007/s10584-024-03717-2.

[3] BPS–Statistics Indonesia, 2023. Indonesian Coffee Statistics 2022. Available from: https://www.bps.go.id/en/publication/2023/11/30/abde293e6c0fc5d45aaa9fe8/indonesian-coffee-statistics-2022.html (cited 20 May 2025). (in Indonesian)

[4] Nasution, S.P., Wibowo, R.P., Supriana, T., et al., 2024. Analysis of Indonesia coffee exports competitiveness in the United States and Japan to promote sustainable market. IOP Conference Series Earth and Environmental Science. 1302, 012137. DOI: https://doi.org/10.1088/1755-1315/1302/1/012137.

[5] Dinas Perkebunan Jawa Tengah, 2023. Plantation Production by Regency/City and Crop Type in Central Java Province (thousand tons), 2023. Available from: https://jateng.bps.go.id/id/statistics-table/3/ZWxKek1URkRaV0kwYlM5T2NHcHRNVkZXTkVkaGR6MDkjMw==/produksi-perkebunan-menurut-kabupaten-kota-dan-jenis-tanaman-di-provinsi-jawa-tengah-ribu-ton---2023.html?year=2023 (cited 21 May 2025). (in Indonesian)

[6] Widadie, F., Wulandari, E., Lestari, R.D., 2024. Business models for engaging smallholder farmers in high–value markets: empirical evidence from vegetable value chains. Agricultural and Resource Economics: International Scientific E–Journal. 10, 179–202. DOI: https://doi.org/10.51599/are.2024.10.04.08.

[7] Widadie, F., Bijman, J., Trienekens, J., 2022. Alignment between vertical and horizontal coordination for food quality and safety in Indonesian vegetable chains. Agricultural and Food Economics. 10, 1–19. DOI: https://doi.org/10.1186/s40100-022-00215-w.

[8] Kaplinsky, R., Morris, M., 2001. A handbook for value chain research. University of Sussex, Institute of Development Studies: Brighton, UK.

[9] Trienekens, J.H., 2011. Agricultural value chains in developing countries a framework for analysis. International Food and Agribusiness Management Review. 14, 51–82.

[10] Kaganzi, E., Ferris, S., Barham, J., et al., 2009. Sustaining linkages to high value markets through collective action in Uganda. Food Policy. 34(1), 23–30. DOI: https://doi.org/10.1016/j.foodpol.2008.10.004.

[11] Jan, F., Pavel, C., 2016. Factors Supporting the Development of Producer Organizations and their Impacts in the Light of Ongoing Changes in Food Supply Chains: A Literature Review. Available from: https://publications.jrc.ec.europa.eu/repository/handle/JRC101617 (cited 20 May 2025).

[12] Widadie, F., Bijman, J., Trienekens, J., 2021. Value Chain Upgrading through Producer Organisations: Linking Smallholder Vegetable Farmers with Modern Retail Markets in Indonesia. International Journal on Food System Dynamics. 12, 68–82. DOI: https://doi.org/10.18461/ijfsd.v12i1.76.

[13] Neilson, J., Shonk, F., 2014. Chained to Development? Livelihoods and global value chains in the coffee–producing Toraja region of Indonesia. Australian Geographer. 45(3), 269–288. DOI: https://doi.org/10.1080/00049182.2014.929998.

[14] Vicol, M., Neilson, J., Hartatri, D.F.S., et al., 2018. Upgrading for whom? Relationship coffee, value chain interventions and rural development in Indonesia. World Development. 110, 26–37. DOI: https://doi.org/10.1016/j.worlddev.2018.05.020.

[15] Creswell, J.W., Poth, C.N., 2016. Qualitative inquiry and research design: Choosing among five approaches, 2nd ed. Sage Publications: New York, NY, USA. pp. 73–81.

[16] Wosene, G., Gobie, W., 2022. Value chain analysis of tomato: The case of Bure, Jabitehinan and North Mecha districts of Amhara regional state, Ethiopia. Journal of Agricultural and Food Research. 7, 100272. DOI: https://doi.org/10.1016/j.jafr.2022.100272.

[17] Kuroiwa, I., 2021. Method of value chain mapping with international input–output data: application to the agricultural value chain in three Greater Mekong Subregion countries. Journal of Economic Structures. 10, 6. DOI: https://doi.org/10.1186/s40008-021-00235-7.

[18] Dalimunthe, A.G., 2021. The Distribution Pattern And Marketing Efficiency Of Robusta Coffee At Tanggamus Regency. Management Research and Behavior Journal. 1, 61. DOI: https://doi.org/10.

29103/mrbj.v1i2.5802.

[19] Silmi, B., Arti, Y., Miftah, H., Sumantri., 2020. Analysis of Structure, Conduct, Performance (SCP) Robusta Coffee Commodities (Coffea canephora). Indonesian Journal of Applied Research (IJAR). 1, 118–127. DOI: https://doi.org/10.30997/ijar.v1i2.59.

[20] Khatri, S., Bhusal, T.N., Kafle, S., et al., 2023. Value chain analysis of arabica coffee (Coffea arabica L.) in Arghakhanchi district of Nepal. Cogent Food and Agriculture. 9, 2247173. DOI: https://doi.org/10.1080/23311932.2023.2247173.

[21] Handayani, S.M., Widadie, F., Rahayu, E.S., et al., 2024. Analysis of added value and market share in porang value chain in wonogiri regency. IOP Conference Series Earth and Environmental Science. 1362, 012010. DOI: https://doi.org/10.1088/1755-1315/1362/1/012010.

[22] Ruben, R., Zuniga, G., 2011. How standards compete: comparative impact of coffee certification schemes in Northern Nicaragua. Supply Chain Management: An International Journal. 16, 98–109. DOI: https://doi.org/10.1108/13598541111115356.

[23] Gereffi, G., Humphrey, J., Sturgeon, T., 2005. The governance of global value chains. Review of International Political Economy. 12, 78–104. DOI: https://doi.org/10.1080/09692290500049805.

[24] Goshme, D., Ayele, T., Duba, D., 2022. Structure, Conduct and Performance of Coffee Market in West Guji Zone Oromia Region Ethiopia. Asian Journal of Dairy and Food Research. DOI: https://doi.org/10.18805/ajdfr.DRF-283.

[25] Barrett, C.B., Bachke, M.E., Bellemare, M.F., et al., 2012. Smallholder participation in contract farming: Comparative evidence from five countries. World Development. 40, 715–730. DOI: https://doi.org/10.1016/j.worlddev.2011.09.006.

[26] Mwangi, V., Owuor, S., Kiteme, B., et al., 2021. Assessing Smallholder Farmer's Participation in the Wheat Value Chain in North–West Mt. Kenya. Frontiers in Sustainable Food Systems. 5, 657744. DOI: https://doi.org/10.3389/fsufs.2021.657744.

[27] Schoneveld, G.C., Weng, X., 2023. Smallholder value creation in agrifood chains: Value network approach. Land Use Policy. 131, 106676. DOI: https://doi.org/10.1016/j.landusepol.2023.106676.

[28] Trebbin, A., 2014. Linking small farmers to modern retail through producer organizations – Experiences with producer companies in India. Food Policy. 45, 35–44. DOI: https://doi.org/10.1016/j.foodpol.2013.12.007.

[29] Groot Kormelinck, A., Bijman, J., Trienekens, J., 2019. Characterizing Producer Organizations: The case of organic versus conventional vegetables in Uruguay. Journal of Rural Studies. 69, 65–75. DOI: https://doi.org/10.1016/j.jrurstud.2019.04.012.

[30] Hill, R.V., Maruyama, E., Olapade, M., et al., 2021. Strengthening producer organizations to increase market access of smallholder farmers in Uganda. Agricultural and Resource Economics Review. 50, 436–464. DOI: https://doi.org/10.1017/age.2021.19.

[31] Lee, C., 2006. Designing Integrated Supply Chains. In: Global Integrated Supply Chain Systems. IGI Global: Hershey, PA, USA. pp. 97–124.